

## PATENT SPECIFICATION

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## DRAWINGS ATTACHED

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## (54) APPARATUS FOR THE CONTROL OF THE OPENING OF COMPARTMENTS IN A STRONG ROOM

(71) We, FICHET-BAUCHER, a French Body Corporate of 61 Rue Carnot, 92 Suresnes, France do hereby declare the invention for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The present invention relates to an apparatus for controlling and checking the opening of the compartments of a strong room each of which has an electromagnetic locking device.

Conventionally the opening of the compartments in a strong room of a bank or the like is checked by a clerk, most often with the aid of a first key by means of which the lock of a rented compartment is made operative which can then be opened only by the client having a second key for the compartment.

This is a constant bother for the clerk, and besides he has no information relative to the open or closed condition of the compartments.

It has already been proposed to control the unlocking of the doors of the compartments of a strong room by means of the keys of a keyboard operatively connected to associated compartments. By depressing a key the unlocking of a corresponding compartment is effected; its open or closed condition may be signalled by illuminating an indicator lamp adjacent to the key or incorporated therein. Such a device becomes very complicated where the number of compartments to be checked is large, the dimensions of the keyboard becomes excessive to be simple for the clerk to operate.

According to the present invention we provide an apparatus for commanding and checking the opening of compartments of a strong room, comprising associated with each compartment an electromagnetic locking device, a memory device connected to each locking device, a control console with a ten keys keyboard having binary outputs for composing a number corresponding to a compartment to be opened, and an unlocking pulse generating key on said console, said memory devices being connected for receiving instructions and said unlocking pulse from the console, whereby the unlocking of the compartment whose number has been composed is triggered by said unlocking pulse, the apparatus being able to respond to the unlocking pulse for only a predetermined period of time, and only after the composition of the correct compartment number. Such an apparatus can have only a small number of electric conductors between a small control console and the strong room, and can give the clerk in charge of the surveillance of the strong room information on the open or closed condition of the plurality of compartments in the strong room.

Preferably, the control console of the apparatus is associated with an electronic display device which displays the number struck and with means for registering the operations effected.

In a preferred embodiment, the apparatus further comprises scanning means for all or part of the memories adapted to mark a stop time on those which correspond to compartments in an open condition such that the clerk is able to be quickly informed as to the open or closed condition of the various compartments at any given moment by observing the display unit.

In order that the invention will be more fully understood, the following description is given, merely by way of example, reference being made to the accompanying drawing in which:—

Figure 1 is a schematic view of one embodiment of apparatus according to the invention;

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Figure 2 is a schematic block diagram of the circuit of the apparatus of Figure 1;

Figure 3 is a more detailed schematic block diagram of a portion of the circuit of

5 Figure 2;

Figure 4 is a view similar to Figure 3 showing a modification of the apparatus illustrating its operation; and

10 Figure 5 is a diagram showing the sequential operation of the various parts.

An embodiment of the apparatus for commanding and checking the opening of the compartments in a strong room (Figure 1) comprises a control console 10 used by a clerk responsible for dealing with compartment users when they are desirous of having access to their compartment which is openable by a key in their possession after the clerk has rendered the lock operable.

20 The console 10 in the present embodiment comprises ten keys 11 with binary outputs for composing the number of a compartment to be unlocked, the number being indicated by lamps 13 of a display unit 12 as the keys are struck. The console also has a key 14 for unlocking a selected compartment, a key 15 for checking the open and/or closed condition of a compartment, the number of which has been selected, a key 16 for checking the condition of all or some of the compartments, a key 17 for resetting the apparatus in case of a false manoeuvre, and a key 18 for enabling intercommunication between the strong room and the console.

35 The console houses electronic circuitry preferably in the form of printed circuits provided for command and checking the opening of the compartments as well as two rotary programming switches 20 and 21 (Figure 2) for composing a code number for preventing non-authorized third parties from operating the console as will be described below. Connecting conductors 22 extend from the console 10 to a control box 23 preferably disposed in the strong room from which extends two-conductor cables 24 connected to the locks 25 of the compartments of the strong room.

50 The keyboard 30 comprising keys 11 is connected to a stroke counter device 31 and a shift register 32 having an output via wire 33 which is carried to the luminous display unit 12 as well as to a serialisator device 34 which forms as a series of pulses in correspondence of the contents of register 32, the pulses originating from a device 35 comprising a pulse source or clock and counters 122 (Figure 3).

60 The stroke counter device 31 is connected by a line 36 to a comparator 37 having inputs 38 and 39 constituted by the outputs of the two rotary programming switches 20 and 21. The output 37 of the comparator 37 is carried by the line 112 to

a first memory 40 connected by a line 113 to a second memory 41 which in turn is connected on the one hand to the stroke counter device 31 and on the other hand to a third memory 43 by a wire 42. The third memory 43 has another input 115 which receives the signal from the stroke counter device 31. The output 45 of the memory 43 is applied to a shift register 32 and two memories 46 and 47 arranged in parallel. 75 The first memory may receive control signals when the unlocking control switch 14 is actuated, and the second memory may receive control signals when the switch 15 for determining the open or closed condition of the compartment after selecting its number is actuated. The memories 46 and 47 are connected by the wires 50 and 51 to the devices 34 and 35 respectively.

85 The signals generated by the device 35 are carried by a wire 52 to a memory device housed in the control box 23 and by a wire 54 to a gate 55 having an input connected by the wire 57 to the memory 47. The signals produced by device 34 on the other hand are carried by the wire 58 to an input of a gate 59 receiving at another input 60 pulses from a clock 61 housed in the control box 23. The operation of the clock 61 depends on the signal from the memory device 53 and on the signal carried by a wire 62 connected to a memory device 63 housed in the console which is operative when the push button 16 for checking in succession all or part of the compartments 25 of the strong room is depressed. The memory 53 also controls the operation of the device 35 and the device 34 via wire 70. 100

105 The locking device for each of the compartments 25 comprises an electromagnet having a coil 83 connected by a conductor 82 to a memory 81 adapted to receive:

1) the signals from the gate 59 after passing through the decoding device 80 at an input 89;

2) an unlocking command from the gate 55 at an input 84; and

3) the signal from a gate 86 connected by the wire 57 to the memory 47 and by the wire 62 to the memory 63 at an input 85.

The apparatus also comprises an intercommunication connection 87 between a station 88 in the strong room and a station 88' at the console 10 adapted to be controlled by actuating the key 18. 120

In one embodiment, the compartment opening command operation and the open and/or closed condition checking operation are registered in chronological order by means of a printer 1 connected to the device 34 and 35 as shown in Figures 2-4.

The operation of the apparatus is as follows: 130

When the user of a compartment desires to have access to his compartment, he reports to the clerk in charge of the surveillance of the strong room and indicates his compartment number. The clerk depresses the two keys of the keyboard corresponding to the pre-programmed code number by means of rotary switches 20 and 21 before composing the client's number on the keyboard. By depressing the first key of the code number one or more of the conductors 101-104 are validated, these conductors extending from the keyboard 30 (Figure 3) and representing the values 1, 2, 4 and 8 for transforming the decimal value of the depressed key into its binary value in the form of an electric magnitude in a manner known per se. The depressing of the first key also causes the triggering of the memory 105 (Figure 3) connected to the keyboard 30 by a conductor 99 and the lighting of the indicator lamp 106 advantageously housed in the key 17 which remains operative during the entire compartment selection and opening cycle.

The striking of the first key of the code also controls by the stroke counter device 31 the change of the condition of a conductor 107 connected to a comparator which receives at its inputs 108-111 in the binary form the value programmed by the rotary switch 20, the value of the first key being introduced in the comparator by the conductors 101-104. In case of nonagreement, i.e. if the value of the key struck is not identical with that of the programming switch 20, the output 112 of the comparator 37 is introduced into the "error" memory 40 having an output 113 preventing storage in the memory 43, and accordingly the reception by the register 32 via memory 43 of the following instructions thus preventing the display of the selected compartment number. It is only after the actuation of the resetting key 17 which triggers the memory 40 into its initial condition that the clerk can once again depress the key for the first figure of the code number.

If, on the other hand, the number struck by the first key is identical with that of the programming switch 20 the output of the comparator 37 is introduced into the "correct code" memory 41.

Depressing the key corresponding to the second figure of the code number controls, by the stroke counter 31, the conductor 115 to change its condition and enables on the one hand the comparison in the device 37 of the number programmed by the rotary switch 21 and the number struck by the second key, and on the other hand the triggering of the memory 43 when the latter receives via wire 42 the signal from the memory 41 indicating that the results of the two successive comparisons effected in

the comparator 37 between the code figures struck on the keyboard and the code figures programmed are satisfactory, i.e. the identity of the code number struck and the programmed code number.

In case of error in the second number struck, the error memory 40 is again triggered such that neither memory 41 nor memory 43 is initiated.

On the contrary, if the code number struck is the same as the code number programmed the "authorization" memory 43 permits the sending of signals leaving the keyboard 30 to the shift register 32 along the conductors 101-104 and representing a compartment number selected by depression of one or more keys corresponding to the number of the compartment after composing the code number. As the keys are hit, their numerical value appears on the display device 12, so that the clerk may, once all the keys are depressed, ensure that the number hit corresponds to the desired number and contrariwise after striking the reset key 17, effect another selecting operation.

When it has been verified that the number displayed is that of the compartment to be unlocked, the clerk depresses the "unlocking" control key 14.

If this operation is not effected within a predetermined period of time, a time delay device returns the apparatus to its initial state.

If this operation is effected within this period of time, it triggers the memory 46 which turns on a display lamp 120 (Figure 3) preferably housed in the push button 14 which remains lit during the entire compartment opening operation, the change of the state of the memory 46 controlling moreover the operation of the device 35 which comprises a circuit 121 for starting its pulse clock and the divider counters 122. The outputs of these counters which are shown at 123-127 are carried to the device 34 for putting in series form the data available in parallel at the outputs 130, 131, 132 and 133 of the shift register 32.

Figure 5 shows the shape and the relative disposition of the rectangular pulses produced by the clock and the counters 122 at their respective outputs 123-127 as well as the state of the conductors 107 and 115 when the key corresponding to the first figure of the code number is struck, rectangular pulse *a*, and the key corresponding to the second figure of the code number, rectangular pulse *b*; the state of the memories 105, 41, 43, 46 and starter device 121 for the clock and for the counters 122 are also shown in this figure.

The signals transmitted in series form by the device 34 are carried by the line 58 with four conductors 134-137 to the input 130

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of the device 80 comprising four decoder counters 138, 139, 140 and 141 responsive to figures in units, tens, hundreds and thousands respectively. The outlets with  
5 ten conductors for each of the decoder counters 138-141 are housed in the control box 23 in the strong room in a suitable manner for selecting each memory 81 at will.

10 When at instant  $t_1$  of the opening cycle, (Figure 5), the conductor 150 coming from the device 35 changes its condition, it blocks the clock and the counters 122 by the circuit 151. Simultaneously this change  
15 of condition is transmitted by the line 54 to the parallel gates 55 and 86 (Figure 3). The output from the gate 55 is applied to each of the memories 81, equal in number to the compartments, and to a timer 153  
20 triggered at the same time that memory 81 was initiated, the number of which was selected to correspond to the compartment to be opened by applying at its input 84 the signal from the gate 55: in the pre-  
25 determined time interval regulated by the timer 153 which may be of the order of five minutes, the user is able to open his unlocked compartment by the energization of the coil 83 connected to the memory  
30 81 which has just been initiated.

After the passing of the time period set by the timer 153, the timer returns the memory 81 to its initial condition: the opening of the compartment is no longer  
35 possible, and if, in the predetermined time period which has just passed, the user has not opened his compartment, he must request the clerk, for example by the inter-communication telephone 87, to unlock this  
40 compartment once again as described hereinabove.

At time  $t_2$  of the cycle (Figure 5) the conductor 150 changes its condition once again, a zero resetting pulse as shown by  
45 the rectangular pulse  $c$  is produced in the circuit 154 from which it is transmitted to the device 80 via line 52 for resetting the decoder counters 138-141 and to the memories 40 and 41, stroke counter 31.  
50 memories 105 and 46 via lines 155 and 156. As soon as this resetting is effected, the indicator lamps 106 and 120 turn off and the clerk thus knows that he may select another compartment and unlock it, for  
55 example if the first client is followed immediately by another client.

In order to ensure that the compartment which has been opened has subsequently been closed by the user after indicating his  
60 departure when passing the clerk, the apparatus is provided with means at the service of the clerk for verifying the open or closed condition of each compartment.

These means comprise the key 15 whose  
65 actuation after the identification code and

the number of the compartment to be checked has been struck effects a change of state in the memory 47 controlling on the one hand the device 35 in a manner similar to that described above for rendering the  
70 compartment operable via conductor 51 and which on the other hand via wire 57 validates the gate 86 and simultaneously blocks gate 55 so that the opening operation is prevented. During the cycle identical to the one described above for commanding the opening, the change of condition of the conductor 150, the gate 86 being opened, causes access to the  
75 memories 81 via input line 54' to the gate 86 and line 85 connected to each of said memories, only the memory corresponding selected by striking the keys of the keyboard 11 being triggered.

If the compartment selected is in fact  
85 closed which is reflected by the closure of the circuit connecting said memory to the coil 83, as schematically illustrated by the switch 83' (Figure 3) no indication is produced: there is no change of condition  
90 in the conductor 70 which controls the devices 34 and 35 which in case the apparatus includes a printer I causes the compartment selected, the time of checking, the fact of the satisfactory closed condition of the  
95 compartment, to be indicated on a tape.

If, on the contrary, the compartment is not in its closed condition, the conductor  
100 70 as shown in Figure 5 changes condition at the same time as the conductor 150 and a gate 160 previously initiated by the triggering of the memory 47 (Figure 3), releases an audio signal indicating to the clerk that the compartment selected is not in its  
105 closed condition.

The outputs of the device 35 connected to the printer are inhibited by the wire 161 connected to the conductor 70 and no indication is produced on the tape of the printer  
110 I.

At the end of the checking or verification cycle, the indicator lamp 47' associated with the checking key 15 turns off as well as the lamp 106 indicating that an operation is in progress, and the lamp 13 of the display device 12 is reset.  
115

The apparatus also comprises means for automatically checking the open and/or closed condition of all or part of the compartments of the strong room. The means are controlled as shown in Figures 2 and 4 by the key 16 for general automatic checking and operate as follows:  
120

Pressing the key 16 causes triggering of the memory 63 which renders the indicator  
125 lamp 162 operative showing that an automatic checking operation is in process as well as an indicator lamp 106 indicating that a checking cycle is completed, this indicator being operative after the triggering  
130

of the memory 105 whose output lead 103 blocks the memory 41 and thus the memory 43 preventing any operation other than checking.

5 The initiation of the memory 63 also triggers, via wire 62, the starting of the clock 61 whose pulses are applied via line 164 to the decoder counters 138-141 then in series as well as to the counters 165-168 of the console receiving at their inputs 165'-168' a signal produced by the memory 63 via fine 172. The outputs of the counters 138-141 are connected to the memories 81 for successively reading out the open or 15 closed condition of each of the compartments 25. The outputs of the counters 165-168 are connected to the device 34 and as shown at 173 for the counter 165 to the display device 12.

20 When one of the compartments is in its open condition which is reflected by the opening of the circuit connecting its associated memory 81 with the coil 83 of the locking device, the conductor 70 connected in series to all the memories 81 changes condition as described previously for the individual checking operation for a compartment and, accordingly, triggers the "blocking" memory 53. This memory 30 commands the stopping of the clock 61 via wire 174 and simultaneously causes the energization of the circuit 121 for starting the clock and counters 122 of the device 35.

35 The number of the open compartment is registered on the display device 12 and when the apparatus includes a printer 1, the device 34 commands the indication of the state of the compartments checked on the checking tape.

40 When a change of state of the conductor 150 appears in a manner analogous to that described above, the blocking memory 53 is again initiated by the conductor 174 causing 45 once more the starting of the clock 61 in order to continue the sequential reading of the memories 81 associated to the compartments 25.

50 In a preferred embodiment of the invention, a stop device 180 (Figure 4) connected by wire 181 to the memory 63 controls as desired the search of a certain group of compartments, for example those corresponding to numbers between 0 and 1999, 55 0 and 3999, etc., up to between 0 and 9999.

At the end of the searching cycle, which for an apparatus for 10,000 compartment lasts in the order of two minutes, the automatic checking memory 63 is initiated once 60 again turning off the lamp 162 and resetting the display device 12.

#### WHAT WE CLAIM IS:—

1. An apparatus for commanding and checking the opening of compartments of 65 a strong room, comprising associated with

each compartment an electromagnetic locking device, a memory device connected to each locking device, a control console with a ten keys keyboard having binary outputs for composing a number corresponding to a compartment to be opened, and an un- 70 locking pulse generating key on said console, said memory devices being connected for receiving instructions and said unlocking pulse from the console whereby the 75 unlocking of the compartment whose number has been composed is triggered by said unlocking pulse, the apparatus being able to respond to the unlocking pulse for only a predetermined period of time, and only 80 after the composition of the correct compartment number.

2. An apparatus according to claim 1, wherein the control console further comprises a display device showing the number 85 composed by actuation of said keyboard keys.

3. An apparatus according to claim 1 or 2, wherein the control console houses means for programming a presettable identification 90 number as well as means for comparing the programmed number with a number composed on the keyboard in correspondence therewith before composition of the number of the compartment to be un- 95 locked.

4. An apparatus according to claim 3, wherein the means for comparing are connected to an authorization memory device, said authorization memory device enabling the passage of data from the control console corresponding to the number of the compartment to be unlocked when the number composed is identical to the programmed number, and preventing the 105 passage of this data when the number composed is not identical to the programmed number.

5. An apparatus according to claim 4, further comprising a resetting key for 110 triggering the authorization memory in case of a false manoeuvre in composing a number on the keyboard.

6. An apparatus according to claim 4 or 5, further comprising a shift register 115 having a first input connected to the keyboard and a second input connected to the authorization memory device, the output of the register constituting the input of a serialiser device for putting in 120 series form the pulses produced by a pulse clock in correspondence with the contents of the register.

7. An apparatus according to claim 5 or 6, wherein the output of the pulse clock 125 is connected to divider counter means.

8. An apparatus according to claim 5, 6 or 7, wherein the serialiser device is connected to decoder counters whose outputs constitute the inputs of the memory devices 130

associated with each one of the compartments, the decoder counters being furthermore connected in parallel to a common resetting conductor.

5 9. An apparatus according to claim 5, 6, 7 or 8, wherein the output of the serialiser device is connected to a printer which is also connected to the clock and the divider counters.

10 10. An apparatus according to claim 5, 6, 7, 8 or 9, wherein the clock and the divider counters transmit a resetting pulse at the end of each compartment opening command cycle.

15 11. An apparatus according to any preceding claim, further comprising a timer for adjusting the predetermined period of time, said timer being connected in parallel to each of the memory devices associated with the compartments.

20 12. An apparatus according to any preceding claim, further comprising a timer for adjusting said predetermined period of time triggered by depression of said unlocking pulse generating key and a memory device interposed in the circuit connecting said key to a pulse generating clock, said memory device being connected to an authorization memory device, the triggering of said first mentioned memory device controlling the energization of an indicator lamp.

25 13. An apparatus according to any preceding claim, further comprising means for checking the open and/or closed condition of a compartment after the number corresponding to the compartment has been composed on the keyboard, the operation of said means being controlled by depressing a key on the keyboard.

30 14. An apparatus according to claim 13, wherein said checking means is connected to an audio and/or visual alarm which is rendered operative when the memory  
45 associated with a compartment whose

number has been composed is found in its open condition.

15. An apparatus according to any preceding claim, further comprising means for scanning all of the memories associated with the locking devices adapted to mark a stop 55 time on those which correspond to compartments in an open condition, and means for displaying the number of the compartment(s) found in the open condition for a predetermined time period.

16. An apparatus according to claim 15, wherein adjusting means are provided for limiting the scanning range to only part of the compartments.

17. An apparatus according to any preceding claim, wherein each electromagnetic locking device is connected to its associated memory by a two conductor wire forming a circuit, an electromagnet for the locking device being disposed in the circuit, said 70 circuit indicating when open the open condition of its associated compartment.

18. An apparatus according to any preceding claim, further comprising delay means for returning the apparatus to its inoperative condition if the unlocking pulse generating key is not actuated within a predetermined period of time after the number of the compartment to be unlocked has been composed.

19. An apparatus according to any preceding claim, further comprising an inter-communication link-up between the control console and the strong room.

20. Apparatus for controlling and checking the compartments of a strong room, such apparatus being constructed and arranged substantially as hereinbefore described.

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SHEET 1

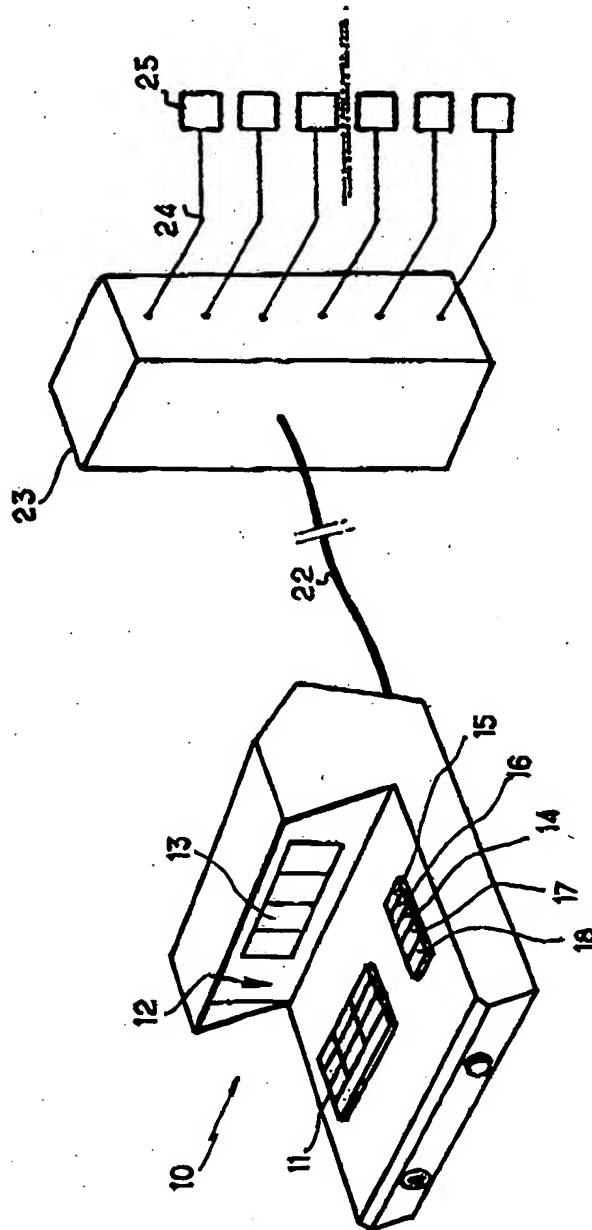


FIG. 1



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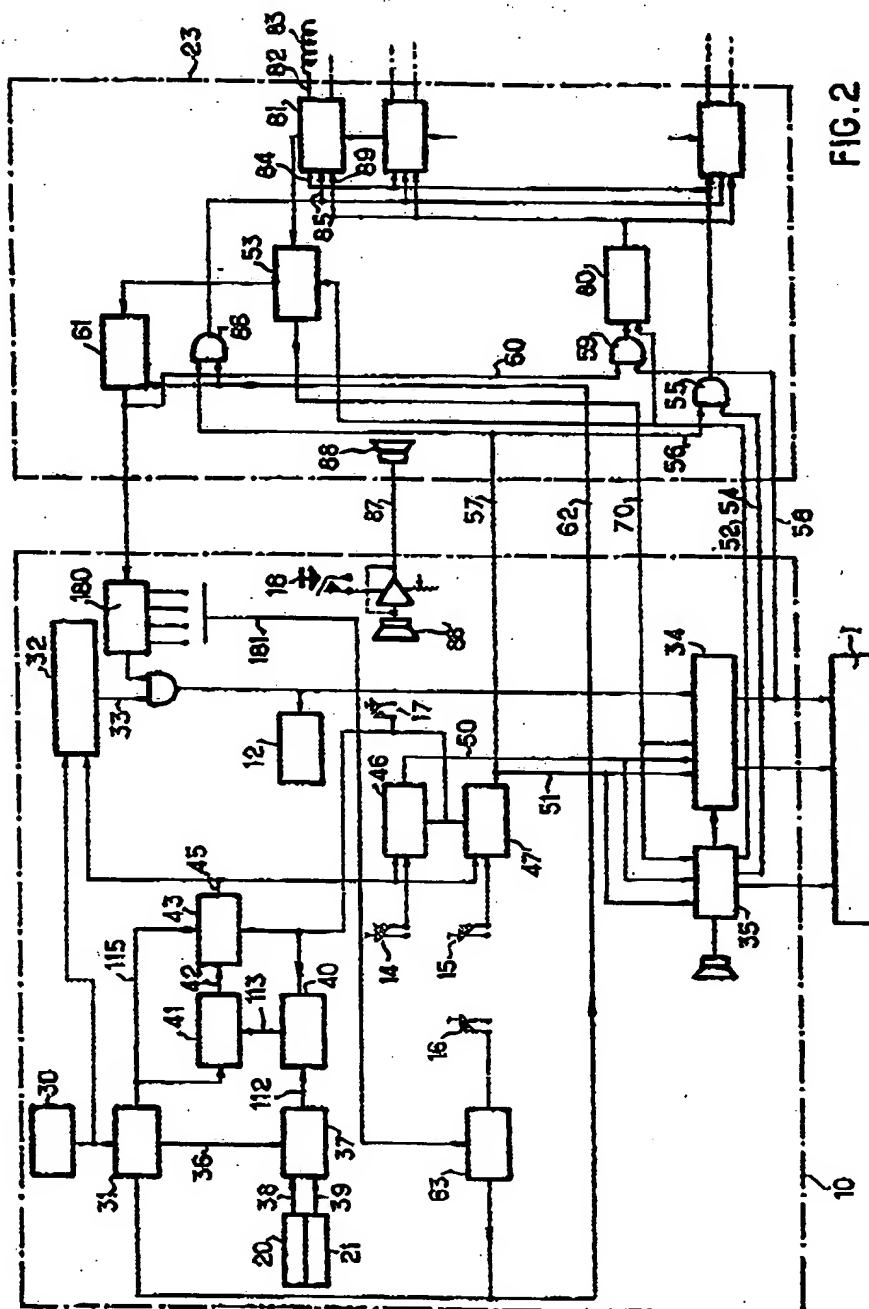


FIG. 2



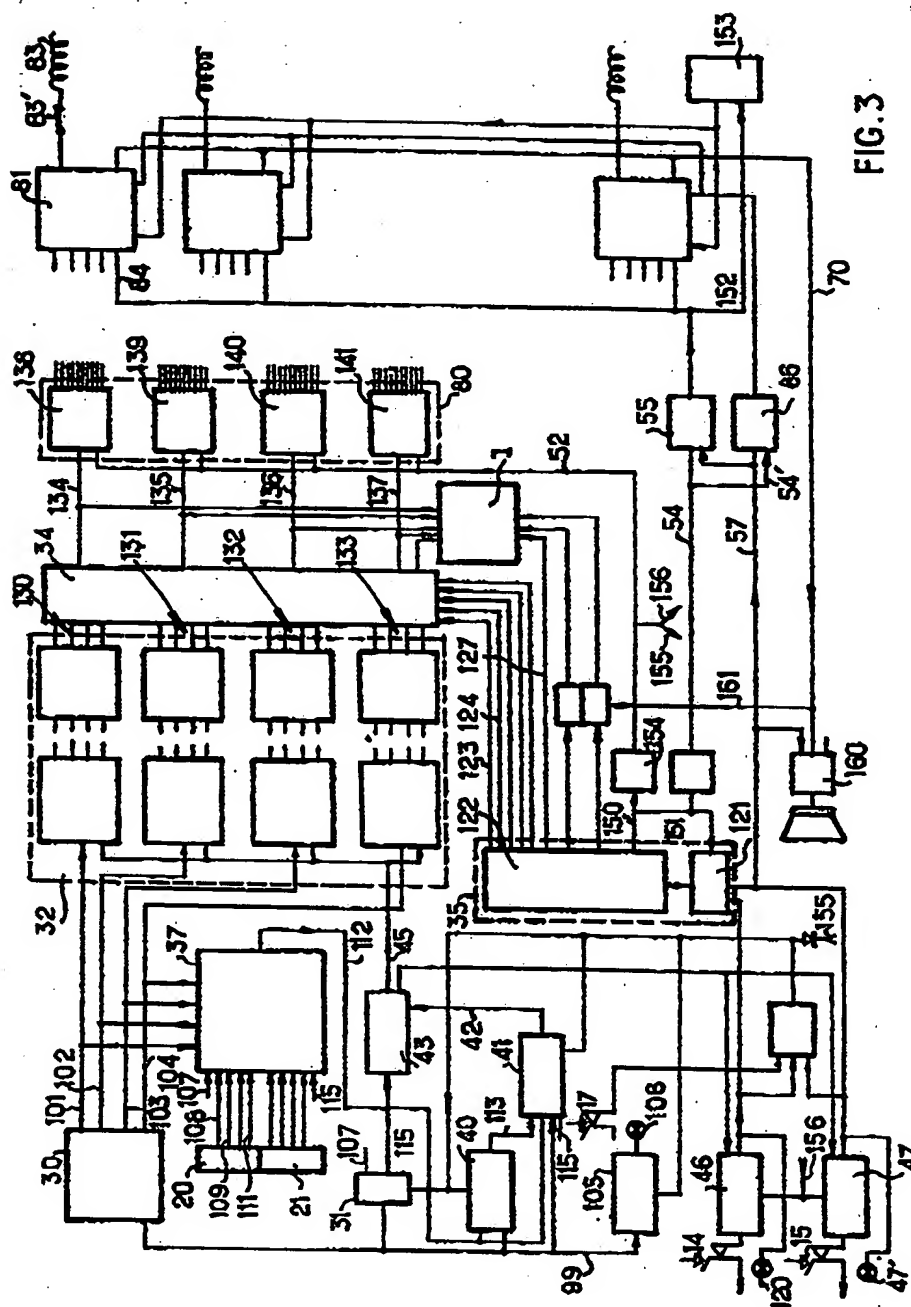
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SHEET 3



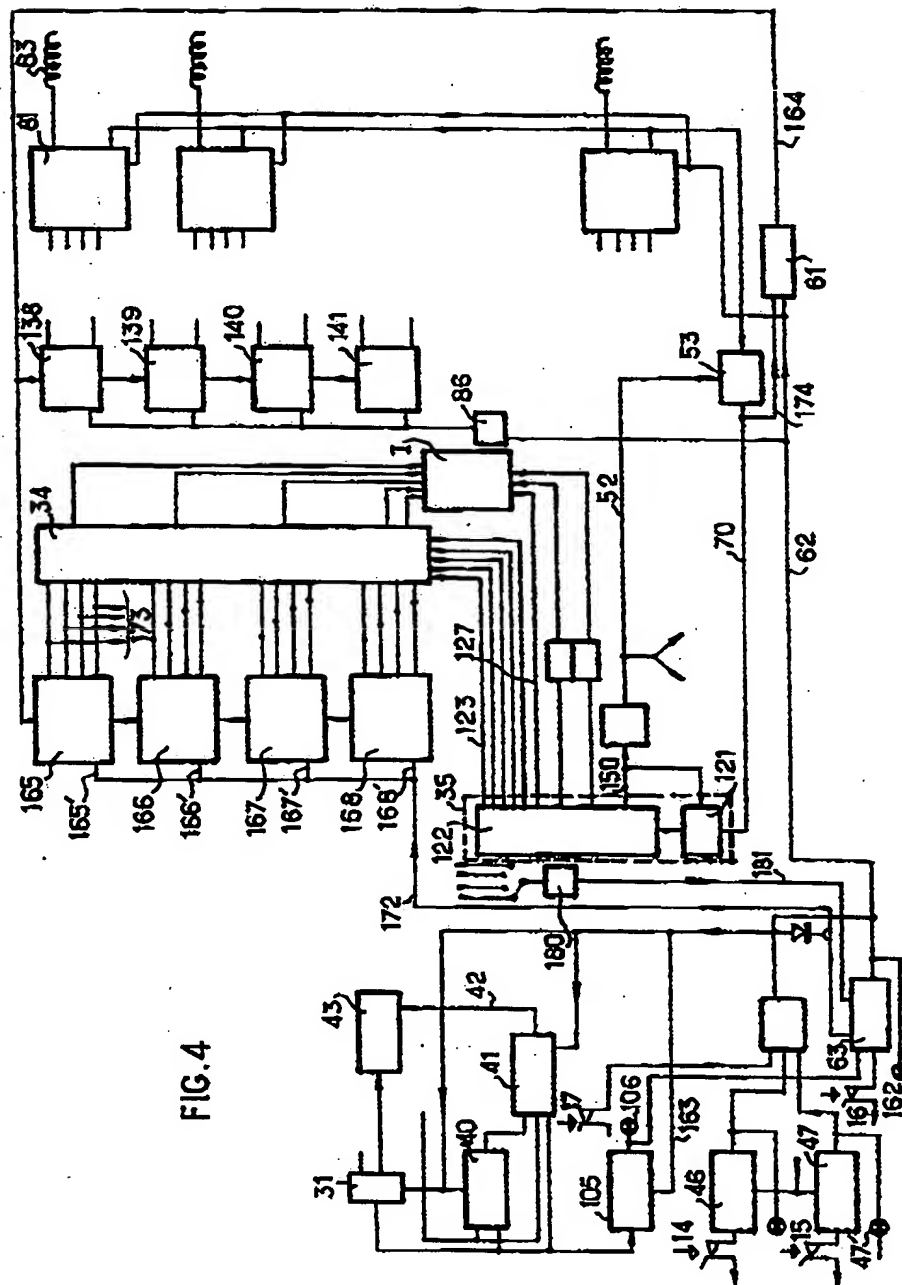
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**SHEET 4**



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